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Travel Time Estimation using Multivariate Regression Model

Khaliqur Rahman*, Shoaib Mallick, Muhammad Asif

Qatar University
* k.rahman@qu.edu.qa

As it is known from the current research and studies that travel time of vehicles is the most reliable parameters to measure the cost of a link. Cost modeling of routes has many useful applications in dynamic route selection strategies e.g. route selection for emergency vehicles. Travel time of an individual vehicle passing a road segment is a function of many parameters which includes of road geometry, traffic flow characteristics, driver's behaviors and region-specific rules and regulations, length of the segment, number of lanes, lane width, traffic flow, traffic volume and density, average speed of vehicles, vehicles composition and the ratio of turn movements on ramps. Moreover, the average travel time of vehicles on freeways is also dependent on some parameters that vary from country to country e.g. traffic regulations, driving rules, driver's behavior and the construction of roads. Current mathematical models and simulation software's lack the implementation of all these parameters and hence the results of these models are mostly different from the actual. The calibration of simulation software is always required to reduce this difference. The estimation of travel time using some numerical computation or simulation software's is not reliable. This paper describes the modeling of travel time as a cost/metric of segments on a freeway. In it, regression models are used to evaluation the travel time for a throughway segment using traffic statistics acquired from field surveys. The validity of the models is explained with their statistical significance. Regression models are equally beneficial for any region if the data sets are quite large and enough parameters are included in the model. In regression analysis, the relationships among different variables are estimated. In it, different modeling techniques are used to find the relationship between dependent and independent variables. More precisely, the analysis helps to realize how the dependent variable changes with the variation of any of the independent variables keeping other variables fixed. In this work, statistical

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techniques i.e. regression modeling and analysis of variance (ANOVA) has been used to evaluate the impact of each independent variable (parameters) on the travel time. Finally, a multivariate regression model is used to approximate the time of travel. The estimated time is related to the actual travel time from the real field data and the model fitness is evaluated. Our dataset constitutes of four independent parameters and one dependent parameters. Independent variable (Inputs): 1 Length of the segment 2 No of lanes in the segment 3 Flow of traffic on the segment 4 Average Speed of vehicles on the segment Dependent variable (Response) 1 Travel Time Regression analysis has been used as a statistical technique to find the response variable (travel time). In this paper it is proposed to find the travel time for a particular connection using regression models applied to actual traffic data sets collected from field surveys. Real traffic data for several segments from different freeways has acquired and analyzed them using regression models. The probable travel time was compared with actual travel time for each segment of the highway and it was found that the estimation using regression models reveals the significant level of accuracy. R-Studio is being used in the statistical analysis of the data. We computed the regression equation for the estimation of travel time for all the given four parameters (distance, lanes, flow, speed) using coefficients, β_0 , β_1 , β_2 , β_3 and β_4 . Figure1 shows the actual travel time of the vehicle and the estimated travel time which is obtained by the regression analysis.